

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(CE) (Sem.-5th)**DESIGN OF CONCRETE STRUCTURES-I**

Subject Code : CE-307

Paper ID : [A0615]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.
4. Use of IS 456 is allowed. Attempt the questions using Limit State Method. Use data suitably, if not given.

SECTION-A**I. Write briefly :**

- (i) Define characteristic strength.
- (ii) Compute the value of limiting moment of resistance factor for M20 concrete and Fe 415 steel for singly reinforced rectangular beam.
- (iii) Which section you would prefer out of Under-reinforced sections and over-reinforced sections? Give the reasons in support of your answer.
- (iv) What is the value of bond stress in tension for M25 concrete and Fe 415 steel? Give its units.
- (v) A column of size 400 mm × 400 mm is reinforced with 12 no 25 mm diameter bars. Design the ties for this column.
- (vi) What are the recommendations regarding pitch and headroom of a staircase?
- (vii) What are the codal provisions for deciding diameter/spacing of reinforcement in the case of one way slabs?

(viii) Define effective length of a column.

(ix) Differentiate between one way slab

(x) Define equivalent shear and equivalent moment of beam members subjected to torsion.

SECTION-B

2. A singly reinforced beam is having effective depth of 400 mm × 600 mm. The effective depth of 18 mm are used as reinforcement. Use M20 concrete and HYSD Fe 415 steel. Assume the following data: The design shear stress τ_{vd} prevail. There is no chance of fire. The extreme fibre of concrete in compression is 0.002. Design the reinforcement in tension.
3. A singly reinforced rectangular beam is reinforced with 5-16 mm diameter bars. The beam is subjected to a factored shear of 52 kN. Design the shear reinforcement. Assume the following data: The design shear stress τ_{vd} prevail. There is no chance of fire. The extreme fibre of concrete in compression is 0.002. Design the reinforcement in tension.
4. A simply supported T Beam has the following data: Effective width of flange : 1500mm, Thickness of flange = 130 mm, Width of rib = 250 mm, Effective depth = 450 mm, Effective span = 6m. The beam is reinforced with 4 bars of 16 mm diameter concrete and Fe415 steel, check the design.
5. Explain the codal recommendations for design of slabs with different support conditions. Draw the reinforcement details of longitudinal bars in slab type stairs at the junction of the flight.
6. What are the merits of limit state method? What are different limit states of design?

SECTION-C

7. Design a slab for an office floor of size $4\text{ m} \times 6\text{ m}$. Take edge conditions as fixed and continuous over all the edges. Use M20 concrete and HYSD Fe 415 steel.
8. A circular reinforced concrete column is 360 mm in diameter. The effective length of the column is 5.20m. Six steel bars of 16 mm diameter are used for longitudinal reinforcement. The spiral bars of 6 mm diameter are provided at 40 mm pitch. Determine the safe load carrying capacity of the column. Use M20 concrete and mild steel bars as reinforcement.
9. Design T- beams for a class room $6\text{ m} \times 12\text{ m}$ in size. The thickness of singly reinforced slab is 120 mm. The top floor is also likely to be used as a class-room. Use M20 grade of concrete and Fe 250 steel. Assume wall thickness of class room as 600 mm. Take width of rib as 350 mm.